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Claims

[c1] 1. A collapsible shaft comprising:
a unitary tube having an outer portion and a depressed portion dividing the outer portion into two segments, the outer portion having an outer exterior radius (Ro), the depressed portion having a depressed exterior radius (Rd), the Ro being greater than the Rd, and the difference between Ro and Rd being a depressed depth (Dd).

[c2] 2. The collapsible shaft of claim 1 wherein the depressed portion defines an area of structural weakness in the shaft.

[c3] 3. The collapsible shaft of claim 1 wherein the shaft is a driveshaft.

[c4] 4. The collapsible shaft of claim 3 wherein the depressed portion has tapered sides.

[c5] 5. The collapsible shaft of claim 4 wherein the depressed portion has a size (Sd) defined as the longitudinal length between the edges of the outer portion adjoining the depressed portion.

[c6] 6. The collapsible shaft of claim 5 wherein the depressed

portion has a longitudinal location (Ld) along the length of the driveshaft and the Ld is longitudinally centered about the Sd.

[c7] 7. The collapsible shaft of claim 4 wherein the depressed portion has a width (Wd) defined as the longitudinal length between the edges of the tapered sides adjoining the cylindrical surface of the depressed portion.

[c8] 8. The collapsible shaft of claim 5 wherein the Ld of the depressed portion is capable of being varied depending on the type of vehicle having the driveshaft.

[c9] 9. The collapsible shaft of claim 2 wherein the area of structural weakness is susceptible to bending collapse upon exertion of a substantial force.

[c10] 10. The collapsible shaft of claim 2 wherein the area of structural weakness is susceptible to axial collapse upon exertion of a substantial force.

[c11] 11. A method of forming a collapsible shaft comprising: denting a unitary tube to from an outer portion and a depressed portion at a location along the length of the unitary tube, thereby dividing the outer portion into two segments, the outer portion having an outer exterior radius (Ro), the depressed portion having a depressed exterior radius (Rd), the Ro being greater than the Rd, and

the difference between Ro and Rd being a depressed depth (Dd).

[c12] 12. The method of claim 11 wherein the denting step is comprised of:
placing a depression member at the location and around the unitary tube; and
denting the depression member in a substantially uniform manner to obtain the depressed portion having the Rd.

[c13] 13. The method of claim 12 wherein the depression member is an anulus ring.

[c14] 14. The method of claim 13 wherein the anulus ring has a predetermined radius and a predetermined depth for obtaining the Rd and Wd, respective, upon denting the anulus ring.

[c15] 15. The method of claim 11 further comprising stabilizing the unitary tube prior to the denting step.

[c16] 16. The method of claim 11 wherein the denting step is repeated one or more times at different locations to obtain two or more depressed portions and three or more segments of the outer portion.

[c17] 17. A collapsible shaft comprising:

a unitary tube having an outer portion and a number of depressed portions (Nd) longitudinally centered about different longitudinal locations along the length of the tube, thereby dividing the outer portion into a number of segments (Ns) defined as the number of depressed portions plus one, each segment having an outer exterior radius (Ro_1 -Ro_n), the depressed portions each having a depressed exterior radius (Rd_1-Rd_n), each Ro being greater than each Rd.

[c18] 18. The collapsible shaft of claim 17 wherein all outer exterior radii are substantially equal.

[c19] 19. The collapsible shaft of claim 17 wherein all depressed exterior radii are substantially equal.

[c20] 20. The collapsible shaft of claim 17 the shaft is a driveshaft.